

## CORRELATION BETWEEN BODY MASS INDEX WITH THE INCIDENCE OF PREECLAMPSIA

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### ABSTRACT

**Introduction:** Indonesia is on its way to achieve the Millennium Development Goals (MDG's) of reducing the maternal mortality ratio by three-quarters between 1990 and 2015. Preeclampsia was the second cause of maternal mortality in Indonesia that was 7-10% from all maternal mortality that happened. Preeclampsia is a disease that occurs during pregnancy, which usually appear after 20 weeks and is characterized by an increase in blood pressure during pregnancy (systolic/diastolic  $\geq 140/90$  mmHg) with proteinuria and edema. Research shows an association between high Body Mass Index with an increase in the occurrence of preeclampsia. **Aim:** This research purpose is to determine the correlation between Body Mass Index with incidence of preeclampsia.

**Methods:** This research used an observational analytic cross-sectional design. The sample used was 46 data from mother with preeclampsia and 46 from mother with normal pregnancy. The data used were secondary data from X hospital on January 2014 until December 2015, selected based on the inclusion and exclusion criteria. Data analysed using Spearman test.

**Result:** Preeclampsia was significantly correlated to high body mass index ( $p=0,000$ , correlation coefficient is 0,632), where 58.7% of obese mothers, 28.26% of overweight mothers were diagnosed with preeclampsia, while only 8.7% of normal weight mothers, and 4.34% of underweight mothers had preeclampsia.

**Conclusion:** The results showed that there was a significant correlation between Body Mass Index and preeclampsia, suggesting that mothers with high body mass index were at a higher risk of preeclampsia.

**Keywords:** Body Mass Index, Preeclampsia, Pregnancy

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## INTRODUCTION

Maternal mortality and morbidity in Indonesia is still a top priority and one of indicators for health services quality. One of development the goal for Millennium Development Goals (MDG's) until 2015 is to reduce the risk of maternal mortality rate (MMR) by 3/4. Overall, MMR in Indonesia is still high compared to other ASEAN countries<sup>(1)</sup>. The direct causes of the MMR are bleeding, preeclampsia, eclampsia, infection, complications, and abortion. While the indirect causes of MMR includes poor nutrient, poverty status, and anemia.

One of the largest cause of mother death is preeclampsia. The number of preeclampsia occurrence is about 7-10% in all pregnancy in Indonesia<sup>(2)</sup>. In the United States, 15% of mothers death were caused by preeclampsia. Approximately 50% of all pregnancy related to preeclampsia. Preeclampsia is still an unsolved issue in obstetrics. It is one of the three main causes of mother death followed by bleeding and infection<sup>(3)</sup>.

Based on reports of maternal deaths in East Java, the main causes of maternal death are bleeding (29.35%), preeclampsia / eclampsia (27.27%), sepsis (6.06%), cardiac problem (15.47%). Preeclampsia, eclampsia, as well as infection and bleeding are estimated to cover 75%-80% of all maternal deaths<sup>(4)</sup>.

Preeclampsia is defined as hypertension after 20 weeks of pregnancy accompanied by proteinuria and edema<sup>(5)</sup>. The cause of preeclampsia was still not known for sure.<sup>(6)</sup> Several theories had been put forward regarding hypertension occurrence in pregnancy such as genetic theory, immunological theory, uteroplacental ischemia theory, free radical

theory, thrombosis theory and diet theory. One possible factor that affects the occurrence of preeclampsia is weight gained during pregnancy<sup>(7)</sup>.

Women with low nutritional status or low Body Mass Index (BMI) has a negative effect on pregnancy outcomes, such as low birth weight. On the other hand, women with exaggerated nutritional status or obesity is said to have a high risk pregnancy such as miscarriage, preeclampsia, thromboemboli, macrosomia, and perinatal deaths<sup>(8)</sup>. An excessive increase in body weight during pregnancy have a three times greater risk of preeclampsia occurrence<sup>(9)</sup>. Based on description above, the researcher wants to know about correlation between body mass index and preeclampsia incident.

## METHODS

This is an observational analytical *Cross Sectional* study using 92 medical record as its sample. 92 data collected were mothers who gave birth in hospital X in January-December 2014-2015.

The inclusion criteria for this research is medical record which contains data on height, weight, and blood pressure. Also a mother who has preeclampsia with 2 and/or 3 of the criteria consist of blood pressure  $\geq 140/90$  mmHg, proteinuria  $\geq +1$ , edema. Exclusion criteria for this research is mother with multiple pregnancy, mola hidatidosa, and diabetes mellitus. 92 medical record samples were divided into 2 groups. First group consist 46 data from pregnancy woman with preeclampsia and second group consist 46 data from pregnancy woman with normal childbirth history.

Data collected were analyzed using *Spearman* test for hypothesis test in SPSS software.

## RESULT

As shown in Table 1, the distribution of the Body Mass Index from mothers with preeclampsia and mothers with a history of normal childbirth was different. The highest proportion of women with preeclampsia were obese (58.70%) and overweight (28.26%). Whereas the in the group of women with normal childbirth history the highest proportion were normal BMI (50.00%) and overweight (32.60%)

Table 1 Distribution of Body Mass Index in Preeclampsia Mothers and Normal Childbirth History in the Maternity Unit of X Hospital in January-December 2014-2015

No.	W	Frequency (n)		Total
		Preeclampsia	Normal	
1	<18,4	2	7	9
2	18,5-22,9	4	23	27
3	23-26,9	13	15	28
4	>27	27	1	28
Total		46	46	92

Spearman test suggested that there were significant correlation between BMI and incidence of preeclapsia ( $p < 0.001$ , *correlation coefficeint* = 0.632)

## DISCUSSION

Based on the samples taken, the distribution of the Body Mass Index in mothers with preeclampsia differ from mothers with a history of normal childbirth. In women with preeclampsia,

the majority had obese body mass index ( $> 27$ ) with 58.7% followed by overweight (23-26,9) as much as 28.26%. Underweight ( $<18.4$ ) and normal Body Mass Index (18.5-22.9) were only 4.34% and 8.7%. This was different from the distribution of the Body Mass Index in mothers with a history of normal childbirth, where the group majority had normal BMI (18.5-22.9) as much as 50% and overweight BMI (23-26,9) as much as 32.6% . Groups with an underweight BMI ( $<18.4$ ) were 15.2% and the obese ( $> 27$ ) were only 2.2%. According to the theory, a high body mass index in women has a three times greater risk of having preeclampsia than women with normal weight<sup>(10)</sup>. In this study, it was found that mothers with a Body Mass Index of more than 27 or obese had a significantly higher risk of experiencing preeclampsia than mothers with a normal and overweight body mass index ( $p < 0.001$ , *correlation coefficeint* = 0.632).

Obesity condition will affect the body's metabolic processes, especially blood circulation. Biochemical changes such as oxidative stress, inflammation, hyperlipidemia, endothelial damage, and vasoconstriction increase the risk of preeclampsia<sup>(5,8,9)</sup>

Immunologic disorders can cause preeclampsia. Preeclampsia will inhibit the invasion of the maternal spiral arteries by trophoblasts which can interrupt placental function so that the placenta produces hydroxyl radicals. Hydroxyl radicals will circulate in the blood vessels and may damage the cell membrane by binding to fatty acids and then turns into fat peroxide which is oxidant. This will damage the endothelium of the blood vessels followed by thrombus formation which

narrows the blood vessel lumen. This pathologic condition will increase blood pressure. Endothelial damage in glomerulus also occurs which causes loss of protein.<sup>(5,7,11,12)</sup>

## CONCLUSION

One of development the goal for Millennium Development Goals (MDG's) until 2015 is to reduce the risk of maternal mortality rate (MMR) by  $\frac{3}{4}$ . One of the largest cause of mother death is preeclampsia. The study found a positive correlation between Body mass index with preeclampsia incidence.

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